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found that the percentage of "crossing-over" in the female is 21.9.

These experiments make clear, first, that *there is no crossing-over in the male* (at least for the number of cases here recorded); second, that *in the female the gametic ratio is about one to four*.

The bearing of the results on the explanation of the absence of crossing-over of sex-linked characters in the male is obvious. In that case the presence of only one sex chromosome in the male made crossing-over impossible, and this was the explanation offered. But the factors concerned with black and wingless lie in a different chromosome (in the sense that they are linked to each other and not to any sex-linked factor) which is present in duplex in both sexes, yet crossing over occurs in one sex only. Whether this second chromosome is the one to which in *Drosophila* the sex chromosome is attached can not be stated, and the question must be left unsettled until we have tested the crossing-over of other factors in this and in other chromosomes.

As Mr. A. H. Sturtevant has pointed out to me, the case here recorded offers apparently an explanation of cases in plants recently described by Bateson and others.<sup>2</sup> When the two dominants enter from different sides no crossing over is apparent, as seen in the first case recorded above ("complete repulsion"). When the two dominants enter from the same side there is evidence of crossing over ("partial coupling"), as shown by the following example. Gray, winged females were mated to black, wingless males, and gave gray, winged  $F_1$  offspring. These inbred produced the following  $F_2$  classes:

<i>BW</i>	<i>GW</i>	<i>Bw</i>	<i>Gw</i>
9	246	65	18

These results in the  $F_2$  generation are of the same kind as those that Bateson and Punnett have recorded for peas, etc. Back-crossing has shown in the flies that the results are due to failure of "crossing-over" in the males. If the same tests, when applied to peas, give

<sup>2</sup> *Proc. Roy. Soc.*, Vol. 84, 1911.

the same result there will be no longer any need to assume, as Bateson and Punnett have done, that there is (A) a system of partial coupling, (B) a system of complete repulsion, or "spurious allelomorphism" or to assume (C) a system of special dichotomous ratios for coupling, such as 3:1 and 7:1, etc.

T. H. MORGAN

#### THE PROBABLE RECENT EXTINCTION OF THE MUSKOX IN ALASKA

THE question of the probable recent extinction of the muskox (*Ovibos moschatus*) in northern Alaska, which has often been mooted, acquires new interest through information kindly furnished me by Mr. Vilhjálmur Stefánsson, who has just returned from four years of exploration in Arctic America in the interest of the American Museum of Natural History. Under date of New York, November 2, 1912, he writes:

*Dear Dr. Allen:* At your request I summarize briefly my information in regard to muskoxen in Alaska secured on the museum's arctic expedition during the years 1908-12; a full statement will in due course be prepared by Mr. R. M. Anderson, who was in charge of the zoological work of the expedition.

(a) Information secured from natives and white residents in Alaska: During the winter 1899-1900 there died at Cape Smythe (or near there) the Eskimo man called Mangi by the whalers (probably Mangilanna). He was the last to die of Cape Smythe (Point Barrow) natives who had seen live muskoxen in that vicinity. He was probably born between 1845 and 1850, as he was able to remember Maguire's visit to Point Barrow. A few years after Maguire's time—perhaps therefore about 1858—there was scarcity of food in winter at Cape Smythe. Mangi's father then went inland looking for caribou, and some distance up the Kunk River, which flows into Wainwright Inlet, they fell in with a band of thirteen muskoxen and killed them all. Since then no one near Point Barrow is known to have killed muskoxen or seen them.

There are many places inland from Point Barrow where muskox skulls and bones are abundant. As these are heavy and there is no market for them locally, few are brought to the coast. Our party secured one skull only.

(b) Information based on specimens: While dig-

ging in an old house ruin about 15 miles southwest along the coast from Cape Smythe an Eskimo last summer (1912) found a muskox skin and brought it to me for sale; it is in the Point Barrow collection which has just arrived at the Museum but has not yet been unpacked. Another Eskimo found a smaller piece of skin in another house which I believe to be of a muskox, though its badly decayed condition makes it difficult to say positively that it is not the skin of the barren-ground bear.

I have myself seen muskox skulls both in the delta of the Colville (imbedded in the earth) and on Herschel Island (on top of the ground).

Respectfully,

V. STEFÁNSSON

In this connection it may be recalled that Richardson in 1829<sup>1</sup> stated:

From Indian information we learn that to the westward of the Rocky Mountains, which skirt the Mackenzie, there is an extensive tract of barren country, which is also inhabited by the muskox and reindeer.

But no muskoxen were found when this section of country was subsequently visited by white men. Muskox skulls, however, have been found upon the surface of the tundra inland from Point Barrow in a condition indicating a recent and not a Pleistocene origin. Thus Mr. John Murdock, of the International Polar Expedition to Point Barrow,<sup>2</sup> reported that just before leaving Point Barrow in 1884 a muskox skull was brought in by one of the trading parties which had been as far eastward as the Colville River, and he presumed that the skull had been brought from there, and adds:

The natives knew the animal well, and called it by nearly the same name as the eastern Eskimos, but none had ever seen it alive. The skull obtained appeared very old and much weathered.

Some years later the McIlhenny Expedition to Point Barrow obtained "one weather-beaten [muskox] skull picked up on the tundra."<sup>3</sup>

<sup>1</sup>"Faun. Bor.-Amer.," I., p. 276.

<sup>2</sup>Rep., 1885, p. 98.

<sup>3</sup>Witmer Stone, *Proc. Acad. Nat. Sci. Phila.*, 1900, p. 35.

Mr. L. M. Turner, in referring to the muskox,<sup>4</sup> says:

There is no positive evidence of the actual occurrence of this mammal within the region here included [the Yukon District and the Aleutian Islands]; but, as the northern Innuits and Indians are so well acquainted with it, there can be no doubt that it has but recently disappeared, if scattered individuals do not yet inhabit the region north of the Rumianzof Mountains near the Arctic coast.

In 1898, Mr. Frank Russell<sup>5</sup> made the following statement:

The muskox was formerly common between the Mackenzie and Behring Straits, as evidenced by the remains which are scattered over the tundra. The oldest natives at Point Barrow say that their fathers killed muskox, which were then abundant.

Recently Dr. W. T. Hornaday has published<sup>6</sup> additional information furnished him by Mr. Charles D. Brower, who has lived at or near Point Barrow since 1884, much of which is in substance the same as that given above by Mr. Stefánsson. The latter, however, not only confirms the main details of Mr. Brower's account, but gives additional facts of considerable importance.

The information presented above, except that recently published by Dr. Hornaday, was gathered and published by me in 1901<sup>7</sup> apropos of the alleged then recent occurrence of muskoxen along the Arctic coast of Alaska east of Point Barrow, based on three fresh skins with their skulls shipped from Camden Bay to San Francisco and thence to New York, where, through the kindness of Mr. E. Bowsky, of New York City, I had opportunity to compare them with skins and skulls from the Barren Grounds east of the Mackenzie. A communication from Mr. A. J. Stone was published in the same connection to the effect that these muskox skins must have originally been obtained by whalers around the head of Franklin Bay or on Parry Peninsula

<sup>4</sup>"Contr. to Nat. Hist. Alaska," 1886, p. 203.

<sup>5</sup>"Expl. in the Far North," 1898, pp. 235, 236.

<sup>6</sup>*New York Zool. Soc. Bull.*, No. 45, May, 1911, pp. 754, 755.

<sup>7</sup>*Bull. Amer. Mus. Nat. Hist.*, XIV., 1901, pp. 81-83.

and by them taken to Camden Bay, as he had found no evidence of the recent existence of muskoxen in northeastern Alaska. This, however, does not in any way controvert the testimony afforded by skulls found on the surface of the tundra near the coast of this portion of Alaska, nor the facts now furnished by Mr. Stefánsson in confirmation of the previous evidence of the existence of living muskoxen there as recently as fifty to sixty years ago.

J. A. ALLEN

AMERICAN MUSEUM OF NATURAL HISTORY

### THE NATIONAL ACADEMY OF SCIENCES

AT the New Haven meeting of the academy held in the new Sloane Physics Laboratory of Yale University, from November 12 to 14, the following papers were read:

Charles D. Walcott: "Cambrian Formations of Mount Robson District, British Columbia." Illustrated.

William M. Davis: "Physiographic Evidence in Favor of the Subsidence Theory of Coral Reefs."

William B. Scott: "Restorations of Tertiary Mammals."

Henry F. Osborn: "Geologic Correlation of Upper Paleolithic Faunas of Europe and America."

John M. Clarke: (1) "The Devonian Faunas of Western Argentina." (2) "Probable Devonian Glacial Boulder Beds in Argentina."

Charles Schuchert: "Climates of Geologic Time." Illustrated.

William M. Davis: "The Transcontinental Excursion of the American Geographical Society."

Arnold Hague: "Biographical Memoir of Samuel Franklin Emmons."

Jacques Loeb: "On the Fertilization of the Egg of Invertebrates with Blood."

Edwin G. Conklin: "Cell Division and Differentiation." Illustrated.

Charles B. Davenport: "Heredity of Skin Color in Negro-white Crosses."

Lafayette B. Mendel (introduced by Russell H. Chittenden): "Some Biochemical Features of Growth." Illustrated.

Thomas B. Osborne: "The Nutritive Value of the Proteins of Maize."

Ross G. Harrison (introduced by Russell H. Chittenden): "Experiments on Regeneration and Transplantation of Limbs in the Amphibia." Illustrated.

S. J. Meltzer: "Theory and Fact as Illustrated

by an Instructive Experiment on the Splanchnic Nerve."

Franz Boas: "New Data on the Influence of Heredity and Environment upon the Bodily Form of Man."

Ernest W. Brown (introduced by Edward S. Dana): "The Problem of the Asteroids."

Robert W. Wood: (1) "Some Results obtained with the most Powerful Spectrograph in the World." Illustrated. (2) "On the Possibility of Photographing Molecules." (3) "On a New Method of Finding Regularities in Band Spectra."

Charles C. Adams (introduced by William H. Dall): "The Variations and Ecological Distribution of the Snails of the Genus *Io*."

### SOCIETIES AND ACADEMIES

#### THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON

A SPECIAL meeting of the Anthropological Society was held at 4:30 P.M., October 29, 1912, in Room 43 of the New Museum Building, the president, Mr. Stetson, in the chair.

Dr. I. M. Casanowicz read a very careful, thorough and interesting paper on the Mithra cult, explaining it as a religion of redemption, which was the most important competitor of Christianity during several centuries. He explained that it was Aryan in origin, antedating the separation of the Aryan people of India from the Iranians, that it was transferred westward by stages, accumulating elements in the Mesopotamian Valley and the Mediterranean Basin, but preserving an Iranian nucleus, that it entered Rome as the religion of the poor and lowly, but was taken up by society when found helpful to imperial policy and made its first convert of an emperor in Commodus. Mithra was essentially the god of light, hence of truth and benevolence; and from the antithesis of light and darkness grew the conception of his war against the powers of evil. Zoroaster built his system on this dualism and conflict, though relegating Mithra to a lower place. Later he came to be regarded as occupying a middle place (on earth) between the powers of Heaven and the evil powers of the underworld, serving also as a mediator between man and the unapproachable supreme deity. The cult of Mithra, he said, had influenced Christianity, especially in the conceptions of the powers of evil, the resurrection of the body, the efficacy of sacraments and the procedures of the church.

W. H. BABCOCK,  
Secretary